

CLAIMS

61 Sub 1 In a computer system including a host computer, a storage device storing data for the host computer, and at least one computer-readable backup storage medium storing backup data copied from the storage device, a method for duplicating at least some of the backup data stored on the backup storage medium, the method comprising a step of:

- (A) copying only a subset of the backup data onto at least one computer-readable duplicate backup storage medium as duplicate backup data so that the duplicate backup storage medium is not an exact duplicate of the at least one backup storage medium.

2. The method of claim 1, wherein the backup data comprises a plurality of work items, and wherein the step (A) comprises a step of:

copying a subset of the plurality of work items onto the at least one duplicate backup storage medium.

3. The method of claim 1, wherein the step (A) includes a step of:

- (A)(1) copying the subset of the backup data onto at least one duplicate backup storage medium having different properties than the at least one backup storage medium.

4. The method of claim 3, wherein the step (A)(1) comprises a step of copying the subset of the backup data onto at least one duplicate backup storage medium of a different type than the at least one backup storage medium.

5. The method of claim 1, further comprising a step of:

- (B) storing, in a logical duplication database, a record indicating that the subset of the backup data copied in the step (A) has been copied to the at least one duplicate backup storage medium.

6. The method of claim 1, wherein the at least one backup storage medium comprises a first backup storage medium including incremental backup data for at least one

B1  
work item at a first point in time and a second backup storage medium including incremental backup data for the at least one work item at a second point in time, and wherein the step (A) comprises a step of copying the first incremental backup data and the second incremental backup data onto a single duplicate backup storage medium.

Sub  
7. A computer-readable medium encoded with a program for execution on a computer system including a host computer, a storage device storing data for the host computer, and at least one computer-readable backup storage medium storing backup data copied from the storage device, the program, when executed on the computer system, performs a method of duplicating at least some of the backup data stored on the backup storage medium, the method comprising a step of:

- (A) copying only a subset of the backup data onto at least one computer-readable duplicate backup storage medium as duplicate backup data so that the duplicate backup storage medium is not an exact duplicate of the at least one backup storage medium.

8. The computer-readable medium of claim 7, wherein the backup data comprises a plurality of work items, and wherein the step (A) comprises a step of copying a subset of the plurality of work items onto the at least one duplicate backup storage medium.

9. The computer-readable medium of claim 7, wherein the step (A) includes a step of:

- (A)(1) copying the subset of the backup data onto at least one duplicate backup storage medium having different properties than the at least one backup storage medium.

10. The computer-readable medium of claim 9, wherein the step (A)(1) comprises a step of copying the subset of the backup data onto at least one duplicate backup storage medium of a different type than the at least one backup storage medium.

11. The computer-readable medium of claim 7, wherein the method further comprises a step of:

- B) (B) storing, in a logical duplication database, a record indicating that the subset of the backup data copied in the step (A) has been copied to the at least one duplicate backup storage medium.

12. The computer-readable medium of claim 7, wherein the at least one backup storage medium comprises a first backup storage medium including incremental backup data for at least one work item at a first point in time and a second backup storage medium including incremental backup data for the at least one work item at a second point in time, and wherein the step (A) comprises a step of copying the first incremental backup data and the second incremental backup data onto a single duplicate backup storage medium.

13. A backup server for use in a computer system including a host computer, a storage device storing data for the host computer, and at least one computer-readable backup storage medium storing backup data copied from the storage device, the backup server comprising:

a controller to control duplication of the backup data, the controller being adapted to copy only a subset of the backup data onto at least one computer-readable duplicate backup storage medium as duplicate backup data, so that the duplicate backup storage medium is not an exact duplicate of the at least one backup storage medium.

14. The backup server of claim 13, wherein the controller comprises:  
means for copying only a subset of the backup data onto at least one computer-readable duplicate backup storage medium as duplicate backup data, so that the duplicate backup storage medium is not an exact duplicate of the at least one backup storage medium.

15. The backup server of claim 13, wherein the backup data comprise a plurality of work items, and wherein the controller is adapted to copy a subset of the work items onto the at least one duplicate backup storage medium.

16. The backup server of claim 13, wherein the controller is adapted to copy the subset of the backup data onto at least one duplicate backup storage medium having different properties than the at least one backup storage medium.

B1 17. The backup server of claim 16, wherein the controller is adapted to copy the subset of the backup data onto at least one duplicate backup storage medium of a different type than the at least one backup storage medium.

18. The backup server of claim 13, wherein the controller is adapted to store, in a logical duplication database, a record indicating that the subset of the backup data copied by the controller has been copied to the at least one duplicate backup storage medium.

19. The backup server of claim 13, wherein the at least one backup storage medium comprises a first backup storage medium including incremental backup data for at least one work item at a first point in time and a second backup storage medium including incremental backup data for the at least one work item at a second point in time, and wherein the controller is adapted to copy the first incremental backup data and the second incremental backup data onto a single duplicate backup storage medium.

20. In a computer system including a host computer, a storage device storing data for the host computer, and at least one computer-readable backup storage medium storing backup data copied from the storage device, the backup data including a first work item, a method for duplicating at least some of the backup data stored on the at least one backup storage medium, the method comprising steps of:

- (A) reading the backup data corresponding to the first work item from at least one backup storage medium as a logical data stream; and
- (B) writing the backup data read in the step (A) to at least one duplicate backup storage medium as a logical data stream.

21. The method of claim 20, wherein the first work item is stored on a single backup storage medium, wherein the backup data further includes a second work item stored in the single backup storage medium, and wherein the method includes a step of not duplicating the second work item onto the duplicate backup medium.

22. The method of claim 20, wherein the step (B) includes writing the backup data to at least one duplicate backup storage medium having different properties than the at least

one backup storage medium read in the step (A).

23. The method of claim 20, further comprising a step of:

(C) storing, in a logical duplication database, a record indicating that the first work item has been copied to the at least one duplicate backup storage medium.

24. The method of claim 20, wherein the step (B) comprises steps of:

(B)(1) writing the backup data read in the step (A) to at least one first backup storage medium as a first logical data stream;

(B)(2) assigning a first expiration time to the at least one first backup storage medium;

(B)(3) writing the backup data read in the step (A) to at least one second backup storage medium as a second logical data stream; and

(B)(4) assigning a second expiration time that is different than the first expiration time to the at least one second backup storage medium.

25. A computer-readable medium encoded with a program for execution on a computer system including a host computer, a storage device storing data for the host computer, and at least one computer-readable backup storage medium storing backup data copied from the storage device, the backup data including a first work item, the program, when executed on the computer system, performs a method for duplicating at least some of the backup data stored on the backup storage medium, the method comprising steps of:

(A) reading the backup data corresponding to the first work item from at least one backup storage medium as a logical data stream; and

(B) writing the backup data read in the step (A) to at least one duplicate backup storage medium as a logical data stream.

26. The computer-readable medium of claim 25, wherein the first work item is stored on a single backup storage medium, wherein the backup data further includes a second work item stored on the single backup storage medium, and wherein the method includes a step of not duplicating the second work item onto the duplicate backup medium.

B1  
27. The computer-readable medium of claim 25, wherein the step (B) includes writing the backup data to at least one duplicate backup storage medium having different properties than the at least one backup storage medium read in the step (A).

28. The computer-readable medium of claim 25, wherein the method further comprises a step of:

(B) storing, in a logical duplication database, a record indicating that the first work item has been copied to the at least one duplicate backup storage medium.

29. The computer-readable medium of claim 25, wherein the step (B) comprises steps of:

(B)(1) writing the backup data read in the step (A) to at least one first backup storage medium as a first logical data stream;

(B)(2) assigning a first expiration time to the at least one first backup storage medium;

(B)(3) writing the backup data read in the step (A) to at least one second backup storage medium as a second logical data stream; and

(B)(4) assigning a second expiration time that is different than the first expiration time to the at least one second backup storage medium.

30. A backup server for use in a computer system including a host computer, a storage device storing data for the host computer, and at least one computer-readable backup storage medium storing backup data copied from the storage device, the backup data including a first work item, the backup server comprising:

a controller to control duplication of the backup data, the controller being adapted to read the backup data corresponding to the first work item from at least one backup storage medium as a logical data stream, and to write the backup data read by the controller to at least one duplicate backup storage medium as a logical data stream.

31. The backup server of claim 30, wherein the controller comprises:  
means for reading the backup data corresponding to the first work item from at least one backup storage medium as a logical data stream; and

B1 means for writing the backup data read by the controller to at least one duplicate backup storage medium as a logical data stream.

32. The backup server of claim 30, wherein the first work item is stored on a single backup storage medium, wherein the backup data further includes a second work item stored on the single backup storage medium, and wherein the controller is adapted to not duplicate the second work item onto the duplicate backup medium.

33. The backup server of claim 30, wherein the controller is adapted to write the backup data to at least one duplicate backup storage medium having different properties than the at least one backup storage medium read by the controller.

34. The backup server of claim 30, wherein the controller is adapted to store, in a logical duplication database, a record indicating that the first work item has been copied to the at least one duplicate backup storage medium.

35. The backup server of claim 30, wherein the controller is adapted to write the backup data read from the at least one backup storage medium to at least one first backup storage medium as a first logical data stream, assign a first expiration time to the at least one first backup storage medium, write the backup data read from the at least one backup storage medium to at least one second backup storage medium as a second logical data stream, and assign a second expiration time that is different than the first expiration time to the at least one second backup storage medium.

36. In a computer system including a host computer, a storage device storing data for the host computer, and a first computer-readable backup storage medium storing backup data copied from the storage device, wherein the first computer-readable backup storage medium is of a first type, a method for duplicating at least some of the backup data stored on the first computer-readable backup storage medium, the method comprising a step of:

- (A) copying at least some of the backup data from the first computer-readable backup storage medium to a second computer-readable backup storage medium of a second type that differs from the first type.

B1  
37. A computer-readable medium encoded with a program for execution on a computer system including a host computer, a storage device storing data for the host computer, and a first computer-readable backup storage medium storing backup data copied from the storage device, wherein the first computer-readable backup storage medium is of a first type, the program, when executed on the computer system, performs a method for duplicating at least some of the backup data stored on the first computer-readable backup storage medium, the method comprising a step of:

- (A) copying at least some of the backup data from the first computer-readable backup storage medium to a second computer-readable backup storage medium of a second type that differs from the first type.

38. A backup server for use in a computer system including a host computer, a storage device storing data for the host computer, and a first computer-readable backup storage medium storing backup data copied from the storage device, wherein the first computer-readable backup storage medium is of a first type, the backup server comprising:

a controller to control duplication of the backup data, the controller being adapted to copy at least some of the backup data from the first computer-readable backup storage medium to a second computer-readable backup storage medium of a second type that differs from the first type.

39. The backup server of claim 38, wherein the controller comprises:

means for copying at least some of the backup data from at least one computer-readable backup storage medium of a first type to at least one computer-readable backup storage medium having a second type that differs from the first type.

40. In a computer system including a host computer, a storage device storing data for the host computer, and a plurality of computer-readable backup storage media storing backup data copied from the storage device, a computer implemented method comprising a step of:

- (A) copying backup data from at least two of the plurality of backup storage media onto a single duplicate backup storage medium.



B) 41. The method of claim 40, wherein the backup data on the at least two of the plurality of backup storage media comprise a plurality of work items, and wherein the step (A) comprises a step of:

(A)(1) copying a subset of the work items onto the single duplicate backup storage medium.

42. A computer-readable medium encoded with a program for execution on a computer system including a host computer, a storage device storing data for the host computer, and a plurality of computer-readable backup storage media storing backup data copied from the storage device, the program, when executed on the computer system, performs a method of duplicating at least some of the backup data stored on the at least one backup storage medium, the method comprising a step of:

(A) copying backup data from at least two of the plurality of backup storage media onto a single duplicate backup storage medium.

43. The computer-readable medium of claim 42, wherein the backup data on the at least two of the plurality of backup storage media comprise a plurality of work items, and wherein the step (A) comprises a step of:

(A)(1) copying a subset of the work items onto the single duplicate backup storage medium.

44. A backup server for use in a computer system including a host computer, a storage device storing data for the host computer, and a plurality of computer-readable backup storage media storing backup data copied from the storage device, the backup server comprising:

a controller to control duplication of the backup data, the controller being adapted to copy backup data from at least two of the plurality of backup storage media onto a single duplicate backup storage medium.

45. The backup server of claim 44, wherein the controller comprises:  
means for copying backup data from the at least two of the plurality of backup storage media onto the single duplicate backup storage medium.

B) 46. In a computer system including a host computer, a storage device storing data for the host computer, at least one computer-readable backup storage medium storing backup data copied from the storage device, and at least one computer-readable duplicate backup storage medium storing backup data copied from the at least one computer-readable backup storage medium, a method for restoring at least some of the backup data, the method comprising a step of:

- (A) restoring the at least some of the backup data from the duplicate backup storage medium when both the at least one duplicate backup storage medium and the backup storage medium are available.

47. The method of claim 46, further comprising a step of:

- (B) determining whether the at least one duplicate backup storage medium is available; and
- (C) restoring the at least some of the backup data from the backup storage medium when the at least one duplicate backup storage medium is determined not to be available.

48. A computer-readable medium encoded with a program for execution on a computer system including a host computer, a storage device storing data for the host computer, at least one computer-readable backup storage medium storing backup data copied from the storage device, and at least one computer-readable duplicate backup storage medium storing backup data copied from the at least one computer-readable backup storage medium, the program, when executed on the computer system, performs a method comprising steps of:

- (A) restoring the at least some of the backup data from the duplicate backup storage medium when both the at least one duplicate backup storage medium and the backup storage medium are available to the backup server.

49. The computer-readable medium of claim 48, wherein the method further comprises steps of:

- (B) determining whether the at least one duplicate backup storage medium is available to the backup server; and
- (C) restoring the at least some of the backup data from the backup storage medium

when the at least one duplicate backup storage medium is determined not to be available.

50. A backup server in a computer system including a host computer, a storage device storing data for the host computer, at least one computer-readable backup storage medium storing backup data copied from the storage device, and at least one computer-readable duplicate backup storage medium storing backup data copied from the at least one computer-readable backup storage medium, the backup server comprising:

a controller to control restoration of the backup data, the controller being adapted to restore the at least some of the backup data from the duplicate backup storage medium when the at least one duplicate backup storage medium and the backup storage medium are available to the backup server.

51. The backup server of claim 50, wherein the controller comprises:  
means for restoring the at least some of the backup data from the duplicate backup storage medium when both the at least one duplicate backup storage medium and the backup storage medium are available to the backup server.

52. The backup server of claim 50, wherein the controller is adapted to determine whether the at least one duplicate backup storage medium is available, and to restore the at least some of the backup data from the backup storage medium when the at least one duplicate backup storage medium is determined not to be available.

53. In a computer system including a host computer, a storage device storing data for the host computer, and a first computer-readable backup storage medium storing backup data copied from the storage device, the backup data including data for a work item stored non-sequentially on the first computer-readable backup storage medium, a method for duplicating the data for the work item, the method comprising a step of:

- (A) copying the data for the work item to a second computer-readable backup storage medium so that the data for the work item is stored sequentially on the second computer-readable backup storage medium.

B1 54. A computer-readable medium encoded with a program for execution on a computer system including a host computer, a storage device storing data for the host computer, and a first computer-readable backup storage medium storing backup data copied from the storage device, the backup data including data for a work item stored non-sequentially on the first computer-readable backup storage medium, the program, when executed on the computer system, performs a method of duplicating the data for the work item, the method comprising a step of:

- (A) copying the data for the work item to a second computer-readable backup storage medium so that the data for the work item is stored sequentially on the second computer-readable backup storage medium.

55. A backup server for use in a computer system including a host computer, a storage device storing data for the host computer, and a first computer-readable backup storage medium storing backup data copied from the storage device, the backup data including data for a work item stored non-sequentially on the first computer-readable backup storage medium, the backup server comprising:

a controller to control duplication of the data for the work item, the controller being adapted to copy the data for the work item to a second computer-readable backup storage medium so that the data for the work item is stored sequentially on the second computer-readable backup storage medium.

56. The backup server of claim 55, wherein the controller comprises:  
means for copying the data for the work item to a second computer-readable backup storage medium so that the data for the work item is stored sequentially on the second computer-readable backup storage medium.